Soil Investigation for
Proposed Landfill
York, Millard & Otter Creek Road
Oregon, Ohio

Mr. Dave Wilson
Wurth, Wilson & Associates
5658 North Main Street
Sylvania, Ohio 43560

Laboratory Job No. DR-1148

July 29, 1974

BOWSER-MORNER
Testing Laboratories, Inc.

BOWSER-MORNER Testing Laboratories, Inc.

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July 29, 1974

Mr. Dave Wilson
Wurth, Wilson & Associates
5658 North Main Street
Sylvania, Ohio 43560

Re: Soil Investigation for Proposed Landfill at York, Millard & Otter Creek Road, Oregon, Ohio
Job No. DR-1148

Gentlemen:

Enclosed is our report of the soil investigation at the above referenced project in Oregon, Ohio.

The purpose of the investigation was to determine the physical characteristics of the soil strata and to determine the stability of the proposed slopes of the landfill. Also to be noted were any conditions that would affect the design or construction of the proposed landfill. If any problem conditions were noted, the report was to include suggested alternate methods to alleviate the conditions.

For your convenience all soil samples recovered will be retained at this laboratory for a period of thirty (30) days unless we are otherwise advised. If there are any questions or if we can be of further service, please contact us.

Respectfully submitted,

BOWSER-MORNER Testing Laboratories, Inc.

J. Richard Hoppenjans

J. Richard Hoppenjans, M.S.C.E., P.E.
Soils Engineer
Toledo Division

JRH/nk

CORPORATE ADDRESS • 420 Davis Ave. • P.O. Box 51 • Dayton, Ohio 45401 • 513/253-8805

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AUTHORIZATION:

Authorization to proceed with the necessary soil investigation was given during July 1974 by Mr. Dave Wilson of Wurth, Wilson & Associates. All work was to proceed in accordance with the verbal agreement between Mr. Wilson and Mr. Hoppenjans, of BOWSER-MORNER Testing Laboratories, Incorporated.

AREA DESCRIPTION:

The site is located in the block of land between York, Millard & Otter Creek Road in Oregon, Ohio. The site is bounded on one side by Otter Creek. The site currently has a large excavation located generally through the center of the property which extends to relatively deep depths. An existing fill dike is located along the edge of the property bordered by Otter Creek. Geologically, the site is situated in a glacial ground moraine composed of till containing an unsorted, unstratified mixture of clay, silt, sand and coarser fragments deposited discontinuously by advancing ice.

WORK PERFORMED:

One (1) boring was made in the relative position shown on the boring location plan included in this report. This boring and resulting data is included in Section III of this report. The boring was made with a truck-mounted boring rig using solid stem augers and employing standard penetration resistance methods (140 pound hammer, 30 inch drop, 2 inch O. D. split spoon sampler) at maximum intervals of five (5) feet or at major changes in stratum, whichever occurred first. The disturbed

samples recovered by the split spoon sampler were visually classified, logged, sealed in moisture-proof jars, and brought to the laboratory for inspection. The position at which a split spoon sample was obtained is indicated on the boring log by an "A" type sample.

Nine (9) moisture content determinations were made. The natural moisture content of each sample recovered was determined. The results of these tests are shown on the Moisture Content Summary Sheet included in Section III of this report.

SOIL PROFILE:

The soil profile at this site, as determined by the boring made for this exploration and two previous borings made at this site in 1973 (see report to Wurth, Wilson & Associates dated November 12, 1973, Job No. DR-985), indicates that the soil at this site is composed predominantly of glacial till materials. The existing dike along Otter Creek is composed mainly of excavated till materials overlying some organic soils which were deposited by Otter Creek. The dike consists of approximately eight and one-half (8½) feet of the till materials underlain by approximately six and one-half (6½) feet of organic silt and clay soils. At approximately fifteen (15) feet in depth a stiff brown clay and silt, with some sand, and a trace of gravel was encountered. This also is a till material. At approximately nineteen (19) feet in depth a gray till consiting of gray clay, with some silt, some sand, and a trace of gravel was encountered and this material extended to the bottom of the borings. The previous two (2) borings made in 1973 were made in the bottom of the pit located at the site and indicate gray

till to an elevation of approximately 510 where the borings where terminated.

Groundwater was not encountered in any of the borings taken at this site.

For specific questions relating to the soil profile, please refer to the boring log included with this report.

RECOMMENDATIONS:

It is our understanding that the proposed landfill is to be constructed according to prints drawn by Wurth, Wilson & Associates for Job No. 273-78, the Westover Corporation. The prints are dated February 7, 1974. The purpose of this investigation was primarily two fold. First, to determine the relative permability of soils at this site for the purpose of determining the possible pollution of Otter Creek and groundwater supplies from sanitary landfill leachate and secondly to determine the stability of the slopes which will be formed by the excavation of the proposed landfill pits. The following recommendations are based on the above understanding, therefore, if there are any changes or if this inofrmation is incorrect, this laboratory should be notified so that it may review the new data.

As the soils at this site consist predominantly of glacial till materials, it is our finding that the soils at this site are impermaeble to the free flow of leachate and that groundwater is generally not present within reasonable extent of the proposed bottom of the landfill. The soil is impermeable to this flow due to its origin which determines its physical structure which is that of a very dispersed, well graded

material, and the fact that fifty (50) percent of the material is of clay size particles with a large portion of this being in the colloidal size range. Therefore, the soil is very impermeable to leachate flow and to groundwater flow and should not present a problem. As the proposed landfill will be eventually at a grade higher than the present grade of Otter Creek, a dike of the gray till soils would need to be built along the edge of the property near Otter Creek at the contact of the organic soils. The strip of organic soil located in boring number 3 approximately six and one-half (6½) feet thick should be partially cut out on the landfill side of the dike and be replaced with gray till soil to form a water barrier approximately five (5) feet wide. The portions of the dike constructed with gray till soils are impermeable. It should be noted, that no groundwater is currently flowing into the excavation from Otter Creek, indicating the high degree of impermeability.

In reference to the stability of the proposed cut slopes, it should be noted that the calculation made for the purpose of this report is of a preliminary nature and only an extensive study of the soils in this area would provide more suitable data than that which is herein contained. Based on the borings made at this site, and on an estimate of the soil strength, a stability analysis was conducted on the proposed cuts for the proposed landfill. It was calculated that the slopes should be stable with a factor of safety of approximately 1.25. For the purpose of this calculation, it was estimated that the existing gray till soils have a shear strength of between 1500 and 2000 pounds per square foot and that the organic soils had zero shear strenth. As the slopes on the inside of the landfill will be reasonably steep and in some cases

vertical, some minor slipping of the soil surface in localized areas will most likely occur during the landfill operation. This will not, however, affect the operation either of the landfill or providing protection for Otter Creek.

In general, therefore, it appears that no major problems will be encountered through the operation of landfill from the stability of the slopes which protect Otter Creek from the landfill. Also, it should be noted that the most severe stability problems will occur only when the trenches are open to the maximum depth and as these will be filled in a matter of days after opening, an additional factor of safety could be estimated for the short period of time these holes will be opened.

In conclusion, therefore, it appears that leaching will not be a problem with the landfill operation in this area and further, that stability problems would appear to be minimal.

LOG OF BORING NO. 3

Proposed Landfill, Oregon, Ohio

BORING LOCATION: As shown on boring location sketch **DATE STARTED:** 7-19-74

SURFACE ELEVATION: Approximately 585 **DATE COMPLETED:** 7-19-74

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(Fill) Stiff gray clay, some silt, trace of sand, trace of gravel, moist	1A	1.0-2.5'	4-5-6	11
	(Becomes Medium Staff at 3.5')	2A	3.5-5.0'	4-3-4	7
5.0'		3A	6.0-7.5'	2-3-4	7
8.5'	Original medium stiff organic gray silt and clay, moist	4A	8.5-10.0'	2-3-3	6
10.0'					
15.0'	Stiff brown clay and silt, some sand, trace of gravel, moist	5A	15.0-16.5'	3-5-7	12
19.0'					
20.0'	Very stiff gray clay, some silt, some sand, trace of gravel, moist	6A	20.0-21.5'	7-10-14	24
25.0'	(Becomes Stiff at 25.0')	7A	25.0-26.5'	4-5-8	13
30.0'					

METHOD: Solid Stem

TECHNICIAN: NW & CK

JOB NO.: DR-1148

WATER OBSERVATIONS

INITIAL DEPTH: NONE

COMPLETION DEPTH: NONE

DEPTH AFTER: _____ HRS. _____

TYPE SAMPLER:

X A. SPLIT SPOON

_____ B.

_____ C. SHELBY TUBE

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SURFACE ELEVATION: Approximately 585 **DATE COMPLETED:** 7-19-74

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
30.0'	(Cont'd) (Becomes Very Stiff at 30.0')	8A	30.0-31.5'	5-8-12	20
35.0'		9A	35.0-36.5'	5-9-13	22 *
	Bottom of Boring at 36.5'				

METHOD: Solid Stem

TECHNICIAN: NW & CK

JOB NO.: DR-1148

WATER OBSERVATIONS

INITIAL DEPTH: NONE

COMPLETION DEPTH: NONE

DEPTH AFTER: _____ HRS. _____

TYPE SAMPLER:

X A. SPLIT SPOON

_____ B.

_____ C. SHELBY TUBE

* Stone in Shoe

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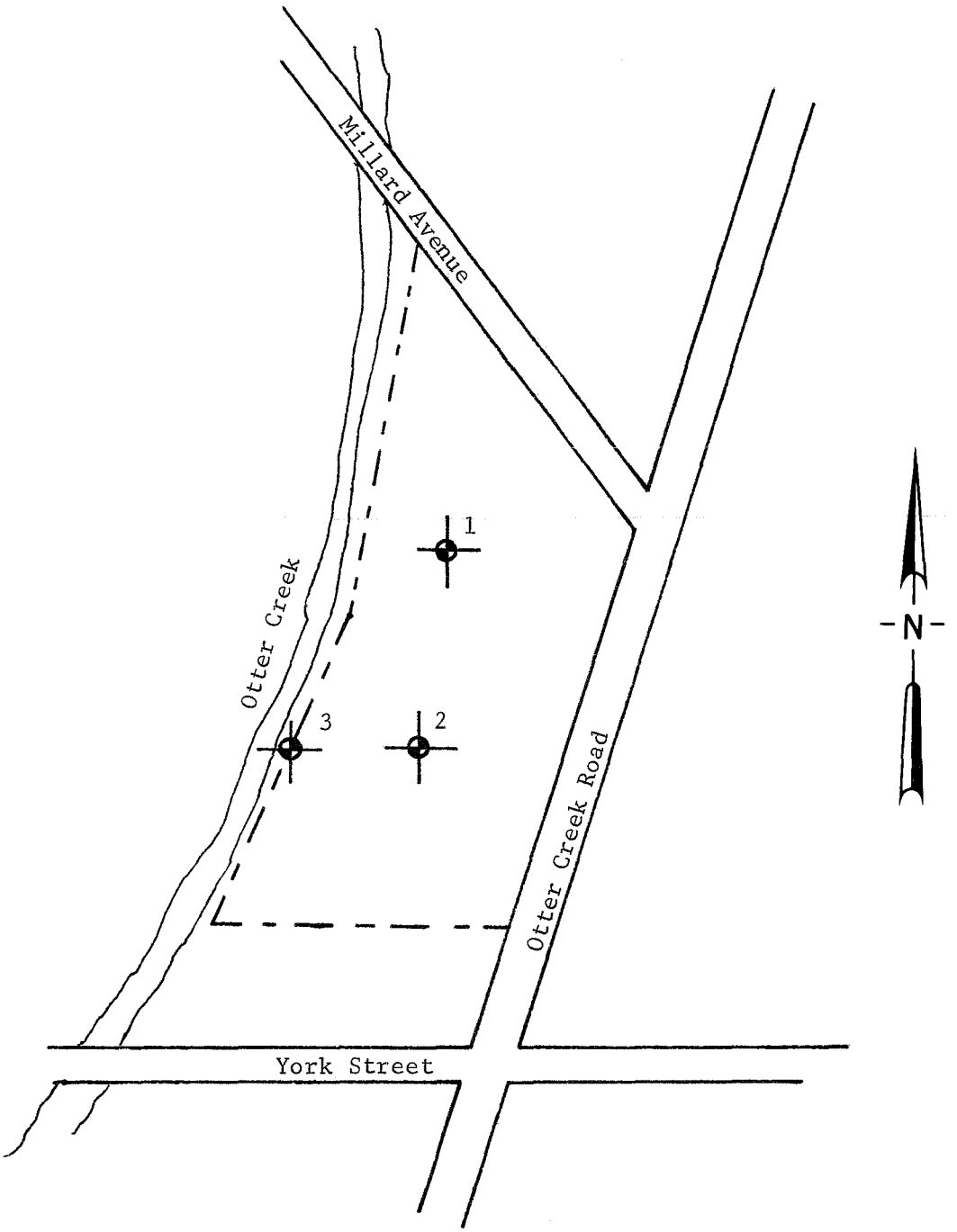
MOISTURE CONTENT SUMMARY SHEET

PROPOSED LANDFILL AT YORK, MILLARD & OTTER CREEK ROAD - OREGON, OHIO

Boring Number	Sample Number	Moisture Content (%)
3	1A	10.8
	2A	17.9
	3A	16.6
	4A	41.1
	5A	17.4
	6A	13.7
	7A	16.0
	8A	18.5
	9A	18.0



Proposed Sanitary Landfill
Oregon, Ohio

Job No. DR-1148
July 29, 1974

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